REMARKS

The above amendments are made in response to the first Office Action mailed on January 11, 2007, wherein:

1. Claims 24-30 were withdrawn in response to a restriction requirement;
2. Claim 20 was objected to under 37 C.F.R. §1.75 as being a duplicate (double-patenting) of Claim 21;
3. Claims 1, 4-11, and 17-23 were rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent Publication No. 2003/0203315 to Farahi, *et al.*, (the "Farahi publication"); and
4. Claims 1-23 were rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,480,764 to Gal, *et al.*, (the "Gal patent") in view of the Farahi publication.

Applicants respectfully thank the Examiner for noting the duplication of Claims 20 and 21. With this Amendment, Claim 21 has been amended to be different from Claim 20, with the amendment to Claim 21 being supported, *inter alia*, by original Claim 8. Also with this Amendment, independent Claim 1 has been amended to recite features from original Claims 2 and 6, independent Claim 11 has been amended to recite features from original Claims 15 and 19, and original Claim 13 has been rewritten as new independent Claim 31, with new dependent Claims 32-41 dependent therefrom. New dependent Claims 32-41 are supported, *inter alia*, by original Claims 14-23, respectively, with new dependent Claim 39 being further supported by original Claim 8. Applicants respectfully submit that no new matter has been entered by these amendments and new claims. Finally, original Claims 2, 6, 15, 19, and 24-30 have been canceled without prejudice. Below, Applicants provide reasons as to why the amended claims are patentable over the cited prior art. **In summary, Claims 1, 3-5, 7-14, 16-18, and 20-23, and new Claims 31-41 are pending in the application.**

Response to the Rejection of 1, 4-11, and 17-23 over the Farahi Publication

Each of independent Claims 1 and 11 has been amended to recite that the cladding layer comprises a positive-type photosensitive cladding material, and that the lower cladding

layer is treated to reduce its sensitive to actinic radiation after it has been developed. This feature reduces the chances that the subsequent pattern exposure of the core-material layer to actinic radiation will further pattern the cladding layer, and provides greater flexibility in the patterns that may be used in the second gray-scale mask. The problem of possible further pattern exposure of the lower cladding layer does not exist when a negative-tone photo-resist is used for the lower cladding layer. This is because the developer for the negative-tone material removes the unexposed portions of the lower cladding layer before the core layer is formed; therefore, the second exposure to actinic radiation cannot expose any more unexposed portions.

The Farahi publication only discloses the use of negative-type materials for its core and cladding layers, and fails to disclose the use of positive-type materials. More importantly, the Farahi publication fails to disclose the step of treating the developed lower cladding layer to reduce its sensitivity to actinic radiation. In this regard, it would not be obvious to modify the Farahi publication to include the treatment step since Farahi uses negative-type material for the lower cladding layer, and, because of this, Farahi's developed lower cladding layer has no sensitivity to actinic radiation (and thus there is no sensitivity to be reduced).

For the above reasons, Applicants respectfully submit that independent Claims 1 and 11, and their dependent claims 4-10 and 17-23, are not anticipated by the Farahi publication, and respectfully request that the Rejection under 35 U.S.C. §102 be withdrawn.

Response to the Rejection of Claims 1-23 over the Gal Patent and the Farahi Publication

The Gal patent does not teach the use of photosensitive optical layers. Instead, the Gal patent forms a layer of photoresist over the optical layer to be patterned, patterns the photoresist layer with a gray-scale mask to form a three-dimensional object, and then transfers the object to the optical layer by anisotropic etching. Therefore, the Gal patent fails to teach the use of a positive-type photosensitive cladding layer, as recited by each of amended independent Claims 1 and 11. The Gal patent also fails to disclose the step of treating the developed lower cladding layer to reduce its sensitivity to actinic radiation. In this regard, since Gal's optical layers do not have sensitivity to actinic radiation, it would not be obvious to modify the Gal patent to include this step.

As indicated above, the Fahri publication also fails to disclose these same features. Therefore, its combination with the Gal patent fails to rectify the deficiencies of the Gal patent.

For the above reasons, Applicants respectfully submit that independent Claims 1 and 11, and their dependent Claims 3-5, 7-10, 12-14, 16-18, and 20-23, are not obvious over the Gal patent in view of the Farahi publication, and respectfully request that the Rejection under 35 U.S.C. §103 be withdrawn.

Response to the Rejection of Claims 13 over the Gal Patent and the Farahi Publication

Original Claim 13 has been rewritten in independent form as new Claim 31. New Claim 31 recites features of the gray-scale masks which produce a waveguide core having an elbow bend at an end of the waveguide, as shown in FIG. 10 of the application. These features enable light to enter or exit the waveguide from the top surface of the substrate, rather than the side of the substrate. Claim 31 recites these features in the second areas of the first and second gray-scale masks that collectively define the second segment of the waveguide's core element. In particular, the second area of the second gray-scale mask defines the upper half of the elbow turn with the combination of the "first portion with a gradation of opacity in the direction of the second area's width" and the "second portion having a circle or oval of constant opacity," where the latter feature defines end of the waveguide core at the top surface of the layer so that light can enter or exit from the top surface of the substrate.

The Fahari publication fails to disclose the combination of these features. Also, the Gal patent fails to disclose the combination of these features. While the Gal patent appears to show waveguides with curved ends in its FIGS. 28 and 29, they are not elbow bends. Moreover, the curved structures of Gal have the purpose of lenses to focus entering and exiting light so that light may be transferred between two parallel waveguides within the substrate.

For the above reasons, Applicants respectfully submit that new Claim 31, and its dependent Claims 32-41, are novel and non-obvious over the Gal patent and Farahi publication.

CONCLUSION

It is respectfully submitted that the above arguments are more than sufficient to overcome the Rejections. As such, not all arguments for patentability have been provided herein, and Applicants reserve the right to present additional arguments for the patentability of any and all of the claims in response to future Office Actions, and at Appeal, if needed.

In view of the remarks made above, Applicants respectfully submit that the application is in condition for allowance and action to that end is respectfully solicited. If the Examiner should feel that a telephone interview would be productive in resolving issues in the case, he is invited to telephone the undersigned at the number listed below.

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Respectfully submitted,

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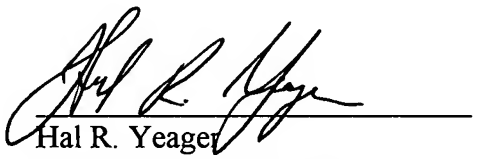

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